BULLETIN of the
SCHOOL OF EDUCATION
INDIANA UNIVERSITY

Suggested Procedures for Securing Economical and Efficient Pupil Transportation

by
Maurice E. Stapley

Vol. XXIII, No. 4 July, 1947

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by

MAURICE E. STAPLEY

Published by the
Division of Research and Field Services
Indiana University

Price, 50 cents, postpaid

For sale by the Indiana University Bookstore,

Bloomington, Indiana

This bulletin is indexed by title in the following:
Bibliographic Index

The current literature section of the
Education Index

Entered as second-class mail matter September 30, 1924, at the post office at Bloomington, Indiana, under the Act of August 24, 1912. Published in January, March, May, July, September, and November of each year, from the University Office, Bloomington, Indiana.

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Suggested Procedures for Securing Economical and Efficient Pupil Transportation

SCHOOL boards, school trustees, and school superintendents are, generally speaking, intelligent and conscientious human beings dedicated to the task of providing excellent educational opportunities. As such, they expend school funds with consideration for the educational results that will be achieved. But, since they are human, they sometimes err.

School buildings have occasionally been erected with too little concern for the activities which were to be provided. Reference books have sometimes been purchased because two sets were offered at the price of one, whether or not the contents were of real significance to the educational program. And, unfortunately quite generally, funds which might well have been used for classroom materials or better instruction have been dissipated in uneconomical methods of pupil transportation.

At a time when costs for instruction have increased tremendously and other school costs have risen sharply, it is a matter of necessity that each expenditure be analyzed carefully. The fact that pupil transportation is merely a method of getting learners to a learning location can no longer be misunderstood. Safe and comfortable transportation service must be provided as cheaply as possible in order that school dollars may be spent for educational purposes whenever possible.

The history of pupil transportation began when it became evident that large schools could provide more service and better service at less expense. The one-room school gave way to the township school, and the pupils rode to their new school home in horse-drawn vehicles. Later, motor vehicles and satisfactory road conditions relieved the horse, but the practice of contracting for transportation service with private individuals continued. And, although motor travel upon good roads has made possible longer routes and further school consolidation, short routes are still to be found in great numbers and the small school concept still prevails.

School Transportation Costs

The factors which most greatly affect the cost of pupil transportation are the size of the administrative unit, the design of the route patterns, and the methods of bus ownership and operation. As each of these factors is presented and discussed, it will be seen that it is closely integrated with each of the other two, and that a successful plan for organizing transportation service must be based upon the combination of a satisfactory unit, well designed routes, and modern methods of bus operation.

The Size of the Unit

It cannot be said that the administrative unit for pupil transportation must have a given area or that it must serve a specified number of children. It is not even possible to establish the minimum number of vehicles which should constitute a fleet. Localities vary so greatly in their composition that a satisfactory unit for one may be unsatisfactory for another. Much depends upon the density and distribution of the school

population, the character of the roads and the weather, and the location of the school buildings to which pupils are to be transported.

However, a large administrative unit is the key to economical pupil transportation. The larger the number of buses operating as an organized group, the simpler becomes the problem of creating route patterns which reduce route duplication and bus mileage to a minimum. A large number of buses under the control of a school board enables the board to secure economies in the purchase, operation, and maintenance of equipment. But perhaps the most conclusive argument for a large pupil transportation unit is that it tends to promote the organization of larger school units, with resulting economies and educational gains.

In any case, the size of the unit should be sufficient to make possible the efficient operation of a fleet of buses. Since one mechanic can service, repair, and maintain twelve or more buses in an adequately equipped school bus garage, that number is usually considered the minimum number which should constitute a fleet. Additional advantages can be gained when there are from two to ten times that number.

It becomes apparent that the county, rather than the township, more nearly approximates the optimum pupil transportation unit in Indiana. During the 1944-1945 school year, the average number of buses per county in the state was 56. It is estimated that the replacement of small inadequate buses by larger vehicles and the more systematic planning of routes would reduce the necessary number of buses per county to at least 35, while the number of buses required when the township is the administrative unit is, as a rule, from two to ten.

In other respects, the county is a more natural unit than the township for pupil transportation and for school organization. More frequently than is generally recognized, the people of the county are already a community, in that they purchase supplies and equipment, market their products, bank their money, and find much of their entertainment in the county seat. In the ordinary affairs of everyday life, except for the education of children, little attention is paid to township lines. In some instances, the arbitrary choice of the county as the pupil transportation unit or the consolidation unit for schools would not bring the best results. If communities have developed without regard for county lines, it may be desirable to create pupil transportation units which follow community interests rather than county lines. If a natural barrier (e.g., a large river) divides the county, it may be unwise to include the two halves in the same unit. There are often two or more city school systems which attract the children of a given county and which appear to be natural centers of pupil transportation units. Whenever county organizations are rejected for reasons such as have been given, care should be exercised to guarantee that all these townships or parts of townships are included in units of sufficient size for economical operation. In other words, an organization which provides for service to a number of townships surrounding a city system may be ideal, but the isolation of one or two townships may create serious problems for those townships.

The Bus Pupil Survey

When the area to be served by a pupil transportation unit has been determined, it becomes necessary to secure accurate information con-

cerning the number and location of all pupils who are to ride buses. This information must be obtained in order to decide upon the number of routes which will be required, the size of the buses which will be needed, and the route patterns for all buses.

Large maps of the area should be procured. Those upon which the farm homes are located are somewhat more desirable, since the task of locating children is simpler and the results are certain to be more accurate. These are usually available at newspaper offices in county seat towns but, if not, they can be obtained from printing concerns specializing in this work in the larger cities.

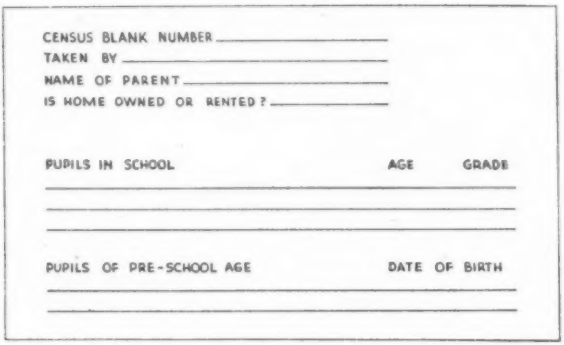
The services of a highly dependable group or organization should be enlisted to make the survey. The selection should take into consideration the fact that the individuals will need to have sufficient leisure time to devote to the project. Parent-teacher organizations, when they are active and interested, are likely to do superior work. Service clubs are usually eager to help, but their members often find it difficult to organize their work so that they can make the necessary visitations. When a high school social studies class is under the supervision of a highly capable teacher, the boys and girls will do as well as adults, and the task will become for them both an interesting and an educational project. In the absence of a satisfactory organization, the township trustee might well select superior individuals to work under his leadership.

The task is not difficult, though it requires attention to details and careful reporting. The data must be accurate and they must be complete. All pupils in the territory to be served by school buses are to be located upon maps by the survey workers. This is done by means of symbols. For example, a circle may represent the home location of an elementary pupil in grades one to eight; and a triangle, a high school pupil in grades nine to twelve. These symbols are convenient because they are simple to draw and are easily distinguishable from each other. They should be drawn relatively small in order to make the location as exact as possible. On the other hand, they must be large enough for the insertion of readable figures within their outlines, as it is advantageous to create but one of each type of symbol at any given location and to record the number of pupils falling in the classification at that location within the symbol. Thus, the number 3 in a circle indicates the home of three elementary pupils and the number 2 in a triangle shows the location of two high school students. The method described reduces the number of symbols necessary, locates pupils by families, and cuts down the chance for error.

Each individual at work on the school bus census should be assigned a definite area for which he is to be responsible. A square mile of territory, or approximately that amount when roads are not parallel, is a reasonable assignment except when the population is unusually dense. Maps should be distributed to workers, with the territory of each clearly outlined, or charts may be prepared with only the territory of the worker shown. Upon these maps or charts, the census taker will locate the elementary pupils and the high school pupils by means of symbols as already suggested.

When the maps of the individual workers are completed, the data should then be transferred carefully to an area map, upon which the location of all bus pupils will be shown. Upon this map there should also be placed the sites of the various schools in the area. Symbols should be adopted for elementary schools, for high schools, and for units including both elementary schools and high schools.

The method described above is simple and relatively effective, but a more complex method, which provides additional data, is superior and should be employed whenever speed is not of paramount importance. Rather than the mere recording of data directly upon individual maps or charts, this method involves the collection of detailed information concerning the children of each home location. The census worker gets the name, age, and grade placement of each child of school age, and also the name and age of each preschool child. This provides information for immediate use and an excellent prediction of pupil transportation needs for the ensuing five years. Information concerning parental occupation and home ownership affords an indication of what changes may be anticipated.


CENSUS BLANK NUMBER _____
TAKEN BY _____
NAME OF PARENT _____
IS HOME OWNED OR RENTED ? _____

PUPILS IN SCHOOL AGE GRADE

PUPILS OF PRE-SCHOOL AGE DATE OF BIRTH

Fig. 1. Census blank

Blanks for the use of census workers may be mimeographed at little expense. These may be patterned upon that which is shown in Figure 1, with whatever modifications seem to be desirable. If each census blank is given a number, the census worker may record the number of a given blank at its proper location on the map of his territory. Symbols for the location of pupils on individual maps are not necessary; the area map may be prepared directly from the information recorded on the census blanks.

The advantages of the second method are that the information is likely to be collected more carefully, that the data can be checked against error, that the spot map may be used more intelligently when population shifts occur subsequent to the creation of bus routes, and that, in addition to the calculation of immediate needs, the census becomes of value

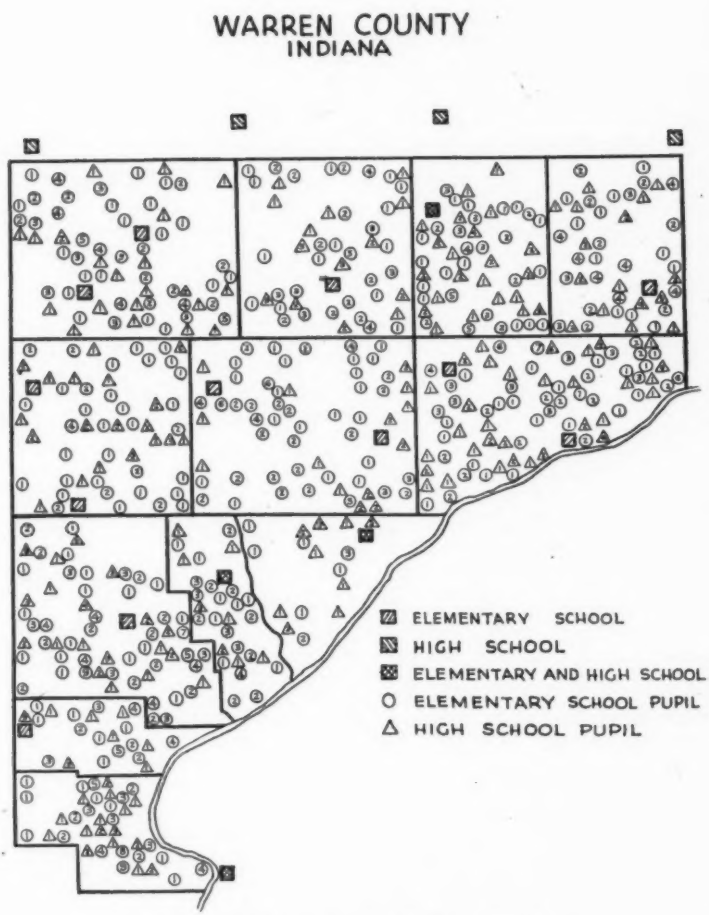


Fig. 2. Pupil spot map showing location of elementary and high school bus pupils

in predicting future requirements. Its only disadvantage is that it requires more time for the collection of data. Its use is strongly recommended.

A sample of what may be expected when the data are transferred to the area spot may may be found in Figure 2. This map, which was prepared during a study of Warren County, Indiana, shows pupil locations for the 1945-1946 school year. It is in one respect incomplete: the

roads of the county are not shown, and the roads should appear on any spot map in order that the data may be more easily analyzed and that the spot map may be used as a guide in setting up bus routes.

Route Planning

After the pupil spot map for the entire area has been completed, the next step is to determine the number of buses which will be required to transport the pupils, and to plan the routes which those buses will travel. These are actually two parts of one process, for the number of buses cannot be intelligently determined without reference to the specific routes they will follow. The character of the routes will also be greatly affected by the limitations of the equipment to be used. If the corporation already has serviceable buses, it may be unwise to replace them, but the route patterns will have to be adjusted to the number of pupils which can be accommodated by the buses owned. In other words, the size of the pupil loads and, to some extent, the length of the routes may be fixed. If the equipment is to be purchased, however, it should be selected with reference to the effect of varying pupil loads and route lengths upon economy of operation.

A study of 2,625 bus routes transporting pupils to schools which received state school relief reimbursement for the 1944-1945 school year has revealed that the cost per pupil per day for transportation is greatly affected by the number of pupils which the bus transports. This is true whether the equipment is owned by private individuals operating under contract, by the school and private contractors jointly, or by the school corporation.

TABLE I. AVERAGE COSTS PER PUPIL PER DAY AS DETERMINED BY PUPIL LOADS ON STATE-AID ROUTES USING PRIVATELY-OWNED, JOINTLY-OWNED, AND SCHOOL-OWNED EQUIPMENT DURING THE 1944-1945 SCHOOL YEAR

Pupils per bus	Average cost per pupil per day		
	With buses privately owned	With buses jointly owned	With buses school owned
1 - 10	$.372	$.383	$....
11 - 20	.366	.388	.309
21 - 30	.279	.258	.276
31 - 40	.223	.191	.165
41 - 50	.187	.156	.155
51 - 60	.173	.138	....
61 - 70	.164	.125	....
71 - 80	.130	.125	.116
81 - 90	.123	.124	....
91 - 100	.111	.095	.087
All buses	$.258	$.197	$.190

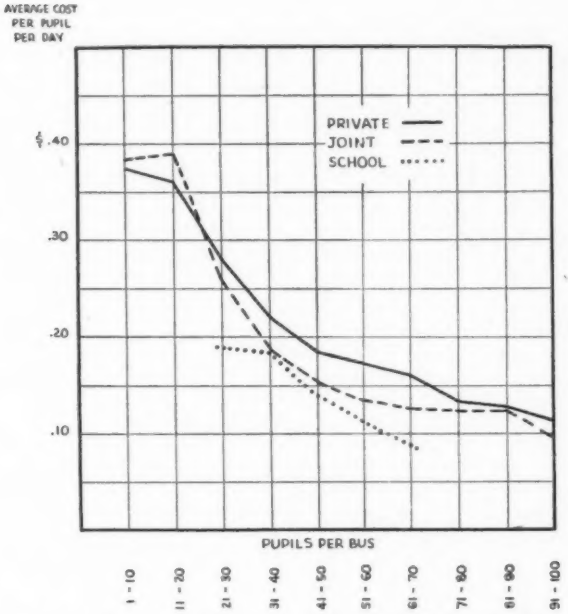


Fig. 3. Costs per pupil per day according to the size of pupil load on state-aid routes using privately-owned, jointly-owned, and school-owned equipment

The results, which are shown in Table I and illustrated in Figure 3, can be interpreted in the following manner: The average cost per pupil per day on privately-owned buses transporting from 11 to 20 pupils was $.366; when from 41 to 50 pupils were transported, it was $.187. In jointly-owned equipment the cost dropped from $.388 per pupil per day when the pupil load was from 11 to 20 to $.156 when the load was from 41 to 50. A similar reduction was found for those routes upon which school-owned equipment was in operation.

The greater the number of pupils per bus, the smaller becomes the cost per pupil, regardless of the method of ownership and operation in use. It would therefore seem that buses as large as can be operated successfully on the roads in any given locality should be used, provided that peculiar situations do not indicate the need for smaller vehicles. In order to sample local opinion as to the size of buses which can be used in general in the state, representative township trustees were requested by questionnaire to give their opinions. The answers received can be summarized briefly, as follows: There are few roads in Indiana upon which buses with a pupil capacity of 48 cannot be used. In most cases, buses with a greater pupil seating capacity are desirable.

That most of the buses now in operation are too small can be seen from an inspection of the data in Table II. Of the 2,625 routes studied, over 24 per cent of the buses serve from 1 to 20 pupils. Over two thirds of the buses are transporting loads of 40 or fewer pupils.

TABLE II. PUPIL LOADS TRANSPORTED ON STATE-AID ROUTES DURING THE 1944-1945 SCHOOL YEAR

Pupils per bus	Number of buses in operation		
	Privately-owned	Jointly-owned	School-owned
1 - 20	612	29	4
21 - 40	926	179	10
41 - 60	520	100	4
61 - 80	111	19	1
81 - 100	43	15	0
101 - ...	37	14	1
Total	2,249	356	20

When the routes studied for pupil load costs are analyzed for costs per bus mile, it is found that short routes are uneconomical and that the cost per bus mile declines rapidly as the length of the bus route increases. The results of this analysis are to be found in Table III, with a graphical presentation in Figure 4. The interpretation is as follows: The average cost per mile for routes of 5.1 to 10 miles in length was $.334 when the equipment was privately owned; for routes of 20.1 to 25 miles in length, it was $.206. When the equipment was jointly owned, the reduction for routes of similar length was from $.360 to $.166; for school-owned equipment the reduction was from $.276 to $.138.

TABLE III. AVERAGE COSTS PER BUS MILE ACCORDING TO THE LENGTH OF ROUTE FOR STATE-AID BUS ROUTES DURING THE 1944-1945 SCHOOL YEAR

Length of route in miles	Average cost per bus mile		
	With privately-owned equipment	With jointly-owned equipment	With school-owned equipment
5.1 - 10	$.334	$.360	$.276
10.1 - 15	.275	.269	.207
15.1 - 20	.233	.198	.178
20.1 - 25	.206	.166	.138
25.1 - 30	.180	.149	.131
30.1 - ..	.158	.117	....
Total	$.254	$.224	$.192

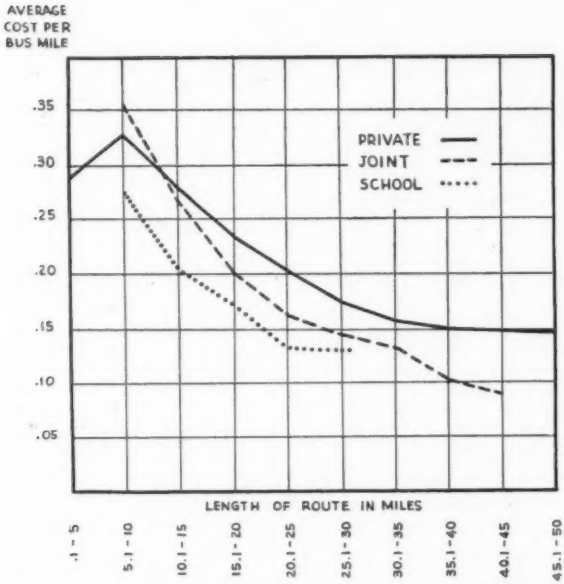


Fig. 4. Average cost per bus mile according to the length of the bus route, as shown by studies of Indiana routes using privately-owned, jointly-owned, and school-owned equipment

It has been generally accepted by experts in the pupil transportation field that one hour before school and one hour after school is the maximum length of time a pupil should be required to ride. Studies of bus operation indicate that an average of 20 miles per hour can be maintained for the entire route, though considerable variation can be expected in individual cases because of local conditions. Routes of 20 miles in length can therefore be considered the most desirable. However, when routes are laid out in a circular design, with the bus leaving and returning to a central location, there is an opportunity to increase the route length without exceeding the established maximum for the total daily riding time of students. This can be done by having the bus take the same course after school which it takes before school, thus unloading first those pupils who have traveled farthest in the morning. Routes established in this manner may easily exceed 20 miles in length without undue discomfort to pupils, and with greater economy of operation.

That routes in Indiana have as a rule been short may be seen in Table IV. The 2,625 bus routes previously described are listed according to the length of the route. Nearly one fourth of these have been 10 miles or less in length, and over three fourths have been of 20 miles or less.

TABLE IV. DISTRIBUTION OF STATE-AID ROUTES ACCORDING TO THE LENGTH OF THE ROUTE DURING THE 1944-1945 SCHOOL YEAR

Length of route in miles	Number of buses		
	Privately-owned	Jointly-owned	School-owned
.1 - 10	595	36	1
10.1 - 20	1,224	222	8
20.1 - 30	348	72	10
30.1 - . .	82	26	1
Total	2,249	356	20

Those in charge of planning routes should think first of the optimum pupil load and bus route length in order to visualize the type of route which should be created. They should then begin experimentation in the creation of routes that will fit into a logical design. The sum total of all bus route mileage should be the smallest that can be arranged. Efforts should be made to transport pupils on routes which do not cover unnecessary mileage and which are reasonably direct. There is usually something wrong with the planning when two or more buses travel the same road, except as that road may approach a school. The exact routes of two buses that pick up children in homes of the same neighborhood must, of course, be scrutinized carefully to see that the wisest plan has been adopted.

Actual route planning, when one has armed himself with all of the information and advice he can get, remains largely a trial and error process. A satisfactory approach to the problem can be made by tacking the area spot map of pupil locations to a drawing board, and placing a sheet of tracing paper over it. With pupil and road locations discernible, one can experiment in route planning without disfiguring the spot map. Since it is likely that many attempts will need to be made before the routes are finally established, no little saving in time and materials will result.

One should not begin his experimentation with a picture in mind of previously existing route patterns. Some of the errors of the past are almost certain to be perpetuated, and an attempt at alteration to avoid such errors merely leads to confusion. It is best to attack the problem as if pupil transportation were a service to be supplied for the first time in the region.

It is well, on the other hand, to recognize that routes are usually best fitted into a pattern when they loop from a school in a central location into adjacent territory and back to the school. If the school is centrally located, the outgoing and incoming paths of each bus route will follow rough approximations of the radii of a circle. In practice, the ideal situation almost never exists, and adjustments or adaptations must be made. How to make a pattern that avoids route duplication and excess mileage is the real problem. The solution for any situation will be

reached through perseverance and ingenuity, for which there is no short method.

One should begin by creating tentatively a first route which conforms to the standards one has in mind and serves what appears to be a logical area. The mileage, number of pupils to be transported, and buildings to which they are to be taken should be checked to see that the beginning is a good one. A second route must then be devised to serve adjacent territory without route duplication. One then proceeds to a third route, and so on, until all of the territory is covered. But the problem, obviously, is not simple. What may first appear to be a well designed route often turns out to include portions of two routes. Frequently, one finds that he will do well to start again, so that he may utilize analysis he has made in the first attempt. In the end, he will struggle through the maze of data and secure surprising results.

Figure 5 illustrates route patterning for an entire county, based on data shown in Figure 2. In its preparation, attention was given to creating routes of desirable length which would serve an adequate number of pupils, and to transporting the pupils of the county with a minimum number of buses operating over the fewest miles possible. For the sake of clarity, routes are shown as beginning where the first pupils are picked up, though in reality they would be expected to start from the schools which they serve.* In this particular situation, it was considered necessary to maintain the school centers now in use, and this necessitated the establishment of several school bus centers for the area.

The location of buildings in this county creates additional problems in school bus routing. For example, elementary pupils living in the northeastern portion of the northeasternmost township must be transported to a school in the southern half of the township, but high school pupils in the same territory must be taken northward to a school in the adjoining county. Such problems have been created because the educational system has not been the outgrowth of a large unit plan. When further consolidation is effected, these problems will disappear and the transportation system can be simplified. For the present, however, transportation must be adapted to fit plant facilities in existence.

Undoubtedly, the proposed routes in Figure 5 can be improved by further experimentation. There is, however, little route duplication, and each route has been designed with reference to the routes of all other buses. The value of the methods used can perhaps best be shown by comparing the results with the system in operation when the bus pupil census was taken. This system of routes appears in Figure 6. It will be noticed that 40 buses were in use, whereas 23 are proposed. The total daily mileage of the 40 buses was 2,055, but the planned daily mileage for the proposed 23 buses is 1,056. The vast difference found in the two plans results in part from attention to the number of pupils per bus but chiefly from the systematic arrangement of routes possible when a large local unit is adopted.

In the county plan which has been presented, no change in school sites has been proposed. It has been assumed that each school in opera-

* Normally, the school buildings would not be included on the maps in Figures 5 and 6, because these maps would be made on tracing paper used over a map on which the schools were located.

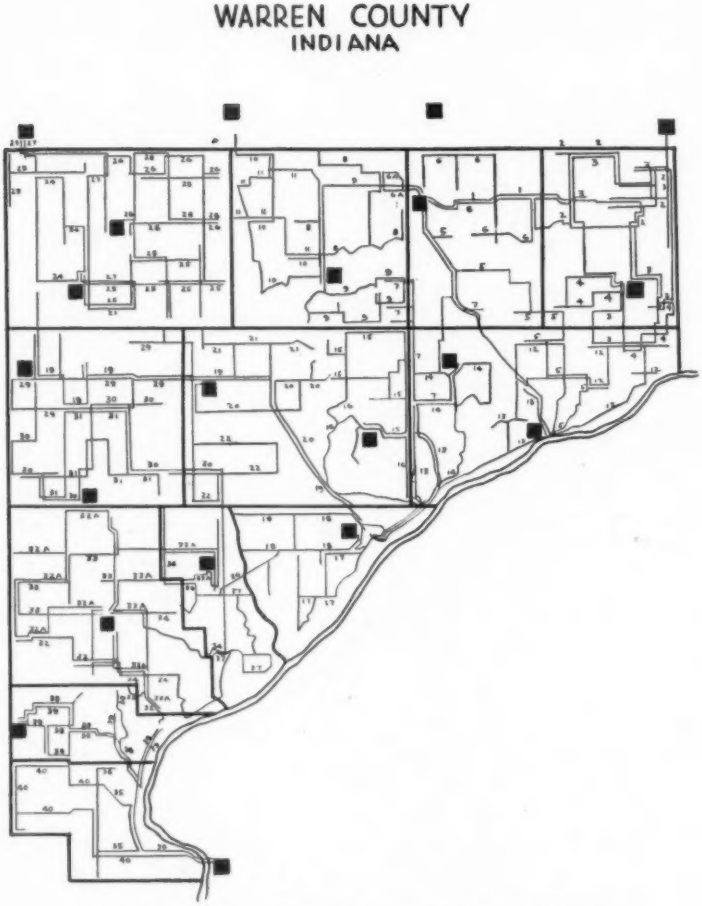


Fig. 5. Bus routes for the 1944-1945 school year

tion when the study was made is to remain in operation. A great majority of the pupils would attend the same schools they previously attended. As a matter of fact, a large number of pupils in the county have been attending schools outside of the township in which they live, and pupils have habitually attended five schools outside of the county. The principle of disregarding township lines is therefore not an innovation, and the only departure from tradition is the assumption that the cooperation of the separate townships will result in mutual benefit.

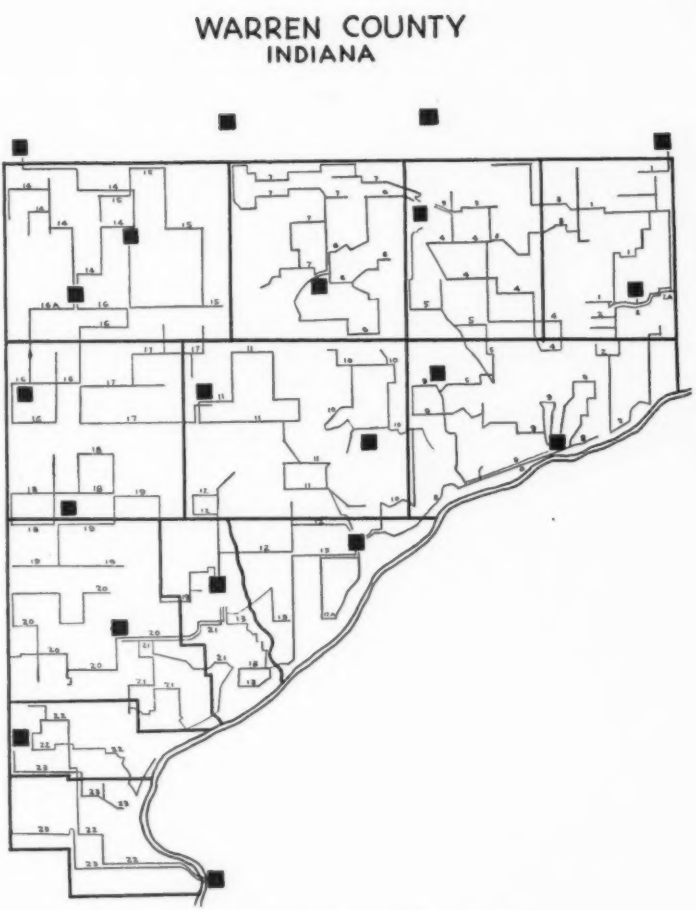


Fig. 6. Proposed school bus routes

Bus Ownership and Operation

A survey of bus needs should be followed by the purchase of equipment, provided that the school authorities do not already own satisfactory buses. Ownership of adequate equipment by individuals in the area who have contracted to supply transportation service is not a satisfactory substitute. There can be no more reasonable defense of school bus ownership by private individuals than for ownership of reference materials, desks, window blinds, or chalk by the classroom teacher.

School ownership of buses is less expensive than private ownership. This has been proved conclusively by many comparative studies.

School ownership is recommended by many state departments of public instruction, and a number of states have few remaining cases of private ownership. In Indiana, school ownership has been tried in only a few school corporations and then on only a limited scale. Where it has been in operation, the unit has been too small to secure the real advantages of the method, but even so it has been decidedly more economical. A comparison of the costs of the different types of ownership has already been presented in Figure 2 and Figure 3. Had the school-owned buses been operated in large fleets and been serviced and maintained in school-owned garages, there would have been opportunities for additional economies.

Other advantages of school ownership are of real importance. There are many reasons for the fact, which various studies have shown, that it provides safer service. School officials characteristically demand better equipment when they purchase than when they contract for the use of equipment. A school maintenance program keeps the equipment in better repair, and the buses are used for school purposes only. Finally, it is easier to secure competent drivers, since a number of people are interested in driving a school bus but would not be available if an investment were required. School trustees who have changed from private to public ownership report that capable drivers are much easier to hire under the new plan.

School officials also find that the pupil transportation program is more easily organized and directed when the school owns the equipment. Pupil populations are constantly shifting, and corresponding shifts in routing should follow immediately. When buses are not contracted for specified routes, there need be no difficulty or delay in making the necessary changes. The use of buses for educational purposes during the school day or during vacation periods may also be planned at the discretion of school officials. The modern school is not confined to the classroom, and therefore benefits from an organization which makes safe and economical transportation available for extracurricular activities.

Joint ownership, which is widely practiced in Indiana, is slightly superior to private ownership. It is, however, only a quarter-step on the road to school ownership. It does not result in easier administration of the program. It does not encourage the development of out-of-classroom learning. And, since it cannot utilize the school garage plan, it fails to secure the major economies possible with school ownership.

The School Bus Garage

Certain of Indiana's township trustees, even though they have had very few school buses under their control, have saved money for their corporations by purchasing their gasoline and oil for school buses at wholesale. They have done, on a small scale, what the school bus garage can do for a fleet of buses. The only real difference is that the operation of a large number of buses as a unit makes better organization and greater savings possible.

The school garage should house the buses in the fleet. It should be their filling station and their repair shop. The mechanic in charge should inspect them regularly in order to keep them in first-class condition.

The necessary tools for a minimum repair program can be obtained for approximately $1,000, and a reasonably complete line of repair equipment can be had for somewhat in excess of $2,000. Since the garage is to be operated without profit or interest upon investment and since supplies and repair parts will be secured at discount, it is easy to see why the program will save school dollars.

A list of equipment for a minimum repair program should include:

1. Air compressor complete with motor—15 cu. ft.
2. Battery rectifier (recharger)—12 batteries
3. Bench grinder with motor—7 inch
4. Brake lining machine
5. Chain hoist—1½ ton
6. Coil tester
7. Compression gauge
8. Compression vacuum gauge
9. Condenser tester
10. Floor jack, hydraulic—4 ton
11. Grease gun—2 lb., air
12. Grease gun transmission—1 qt.
13. Miscellaneous small tools
14. Miscellaneous wheel pullers
15. Painting outfit complete with motor
16. Tube vulcanizer
17. Vacuum pressure gauge
18. Valve seat set
19. Vise—4 inch
20. Wheel aligner machine

Desirable equipment for more complete repair service follows:

1. Band and rip-saw and woodworking tools
2. Boring bar—2.2" to 4.26"
3. Electric drill—⅝ inch
4. Hydraulic hoist
5. Hydraulic press
6. Pinhole grinder
7. Ridge reamer—2 11/16" to 4⅛"
8. Small shop lathe
9. Valve refacer complete
10. Welding and cutting outfit complete

In those situations in which it is impossible to organize routes so that most of the buses have their terminals near a central shop site, modifications of the bus garage plan may be necessary. Major repairs may still be made in the central garage but, if the nature of the organization makes it advisable, minor repairs and supply service may be supplied at substations, at private garages, or by a service and repair truck. If a truck of this type is used, it should be equipped with tire and battery replacements, repair parts that can be installed on the highway, gasoline and oil tanks, and adequate tools.

Selection, Training, and Supervision of Drivers

Willingness to underbid competitors is not a satisfactory basis for the selection of school bus drivers. Better bases are: demonstrated ability to drive skillfully (as shown by a test with a bus), ability to secure the respect and co-operation of bus children (as determined by character and personality), and fitness both mental and physical (as determined by a physician). It is well that definite policies governing the selection of drivers should be adopted.

In-service training for bus drivers can be of value in increasing their driving efficiency, their knowledge of rules and regulations, their knowledge of the machines they operate, and their understanding of the responsibilities of supervising bus children. Instructors for the various types of units can be chosen from the chief bus mechanic, state police, administrators in the school system or systems, etc. Some of the units for the instruction may be found already prepared in *Training Bus Drivers*, a U.S. Office of Education publication.

The task of supervising the school bus program will become much easier if both drivers and pupils have definite knowledge of what is expected of them. The preparation of mimeographed rules and regulations concerning the operation of buses will promote safer and better service and help drivers to secure and to maintain good conduct. A companion pamphlet for pupils is a desirable method for distributing information and advice to them.

Pamphlets may be patterned upon the sample supervisory aids which follow. These have been developed from a study of such supervisory aids in use in many states.

Rules and Regulations for the Operation and Care of School Buses

1. It is illegal to operate a school bus except for transporting pupils to and from school, or for school activities approved by proper officials.

2. You should inspect your bus daily to see that it is clean and that it is in good condition. Such details as the condition of lights, windshield wipers, signal devices, first-aid kits, emergency doors, etc., should receive careful attention. Before you drive at night, clean your windshield and headlights.

3. Your appearance and habits are of great importance. A school bus driver should be neat and clean. He should not use profane language, smoke on the bus while transporting pupils, or eat while driving.

4. You should use great care in stopping and starting your bus in order that children will not be injured. Pupils must be seated before the bus starts, and must remain seated until it comes to a full stop. The clutch should be disengaged at each stop.

5. You should not leave the bus while children are in it. If this is unavoidable, you should shut off the motor and take the key with you.

6. Buses should be refueled before or after the bus trip, not after the bus has been loaded.

7. You are responsible for the health and safety of your pupils. It is dangerous to permit dogs, cats, or other pets; firearms or explosives; or other questionable objects to be transported on the bus.

8. When you stop along the highway, leave the traveled portion whenever possible. Do not stop unless you can see clearly in both directions. Do not start the bus until you are certain that pupils are at a safe distance. If pupils are to cross the highway, see that they do so before you continue on the route.

9. Drive carefully. Your speed should never be great. It should always be moderated when approaching curves or other danger spots. Turning requires particular care, and passing vehicles even more. Always keep the bus on the right side of the road. Never drive close behind another vehicle.

10. Be prudent and courteous. Yield the right-of-way to any other vehicle. Permit vehicles to pass whenever possible. Always signal your stops and turns in sufficient time for drivers of other vehicles proceeding in either direction.

11. Be cautious. Drive with the doors closed. Do not disengage your clutch except when coming to a full stop.

12. Be doubly cautious at railroad crossings. To stop is not enough. Never proceed without absolute certainty that no danger exists.

RULES AND REGULATIONS FOR SUPERVISING PUPILS ON SCHOOL BUSES

1. You will like your job and be most successful if your pupils like you and respect you. They will do so if you are pleasant, courteous, and businesslike in your relationships with them.

2. It is wise to establish rules for pupil conduct when the school term begins. Students should know that such rules are established for the benefit of all, and that you will be firm in requiring obedience.

3. Pupils should be assigned seats in some logical manner. They should take these seats upon entering the bus and should remain in them until they have reached their destination.

4. Except for ordinary conversation, pupils should be required to observe the usual classroom behavior regulations. They must not be permitted to throw articles on the bus or out of the windows. They must not stand up while the bus is in motion, protrude arms or heads from bus windows, or do anything to block your rear mirror vision. Do not permit eating or smoking on the bus.

5. Do not permit teasing, trick-playing, or scuffling on the bus. Pupils should understand that they are not to attract your attention while the bus is in motion except in an emergency.

6. If pupil conduct requires correction, stop the bus and secure order before proceeding.

7. Do not permit pupils to transport pets, dangerous objects, or other objectionable articles.

8. Do not allow students to sit in the driver's seat, to meddle with bus attachments, to open and close doors, or to use the emergency door except in an emergency.

9. You should pick up and discharge students at authorized stops only.
10. Major disciplinary difficulties should be reported to the principal. If a student is to be punished or deprived of his privilege to ride the bus, action should be taken only after a conference with school authorities.
11. Pupils should be advised frequently concerning the dangers in crossing highways, and in entering and leaving the bus.
12. Remember that you are responsible for the conduct of pupils, and that strict observance of rules, tempered with kindly and fair treatment, is the only method which will assure success.

RULES AND REGULATIONS FOR PUPIL CONDUCT ON SCHOOL BUSES

Since you wish to ride safely and comfortably to and from school, you have certain duties and responsibilities. Please study the following rules carefully, and resolve to obey them. Remember that the driver requires your obedience both because it is his obligation to do so and because it is for the welfare of the group. Do your part cheerfully.

DO—

1. Enter the bus in orderly fashion and take the seat assigned to you.
2. Have a good time on the bus. Be friendly and courteous to other students and to the driver.
3. Promote your own personal safety by remaining seated while the bus is in motion, and by keeping your head and arms inside the bus when windows are open.
4. Promote group safety. Leave your pets, guns, knives, or other dangerous or objectionable objects at home.
5. Be a good housekeeper. Keep your books and personal belongings in proper order and in a proper place.
6. Observe the time schedule for meeting the bus in the morning and go directly home when you leave the bus in the afternoon.
7. Consider your ride to school a privilege which you wish to retain.

DON'T—

1. Leave your seat until the bus has stopped to discharge you.
2. Keep others from having a good time by throwing articles, teasing, playing tricks, or otherwise becoming a pest.
3. Endanger the safety of everyone by blocking the driver's rear mirror vision or by attracting his attention while the bus is in motion.
4. Encourage accidents by meddling with the bus or its instruments. You must not sit in the driver's seat, open or close doors, or use the emergency door except in case of emergency.
5. Create a mess by throwing waste paper or other refuse on the floor or out of the window. Eating and smoking on the bus are specifically forbidden.
6. Play on the highway, or hurriedly and carelessly cross through traffic.
7. Disregard your many responsibilities and duties.

The forms which will be needed for the administration of pupil transportation will vary considerably with the size and organization of the program. In most situations, there will be needed a physical examination blank for drivers, a time schedule report form for bus stops, and blanks for absence and accident reports. When there is school ownership and maintenance, forms for the accounting of supplies, repairs, bus and tire depreciation, etc., will be needed. Because of space limitations, samples of but three of the various forms needed are shown.

SCHOOL BUS DRIVER'S PHYSICAL EXAMINATION CERTIFICATE

I certify that I have examined.....
as recorded in the results tabulated below, and find him in my judgment physically (qualified, unqualified) for school bus driver service.

.....M.D.

Date.....

Report of Examination

(Cross out all words not applying and fill in all blanks)

1. He is (free, not free) from tuberculosis as shown by a chest X-ray.
2. He is (free, not free) from infection as indicated by urinalysis and Wassermann tests.
3. He is (free, not free) from contagious skin diseases.
4. His nose and throat are (in normal condition, deviate from normal as described hereafter.....
.....).
5. He (has, has not) normal hearing in both ears.
6. His vision is describable as
   Left eye.....Corrected to.....
   Right eye.....Corrected to.....
7. He has color perception for (red, green).
8. He (has, has not) normal use of both hands and both feet.
9. His heart (is, is not) in satisfactory condition.
10. His condition is otherwise (normal, abnormal in the following respects .....
.....
.....).

TIRE RECORD

MAKE AND NUMBER	SPEEDOMETER READING MOUNTED	SPEEDOMETER READING REMOVED	TOTAL MILEAGE	BUS NUMBER	COST	REPAIRS	SALE PRICE	COST PER MILE

DAILY TIME SCHEDULE

Bus number..... School.....
Time of stops For the following pupils
A.M. ....
....
....
....
....
....
....
..... (Arrives at school)

P.M. ..... (Leaves school)
....
....
....
....
....
....
....
Driver.....

Conclusion

Pupil transportation should be provided whenever necessary to establish or maintain a centralized school. The service should be so organized that it guarantees safe, comfortable rides.

On the other hand, the needless expenditure of one dollar for transportation is a dollar slashed from the budget for education. Officials can best prevent that misfortune by organizing for the operation of pupil transportation in large local units, by systematic planning of routes, and by the adoption of a school ownership and maintenance plan.

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BULLETINS IN THE FIELD OF EDUCATION, INDIANA UNIVERSITY

The Bulletin of the School of Education, Indiana University, was first published in 1924 and has appeared regularly since that time. Research studies of interest to educators, proceedings of conferences held, and bibliographies of educational materials have been the principal fields touched upon in these bulletins. A complete list of the bulletins may be obtained from the School of Education upon request. The studies included in the present volume and in the two volumes immediately preceding it in date are listed below. Unless otherwise noted, these may be obtained for 50 cents each from the Indiana University Bookstore, Bloomington, Indiana.

One Hundred Fifty Years of Arithmetic Textbooks. By Henry Lester Smith, Merrill T. Eaton, and Kathleen Dugdale. Vol. XXI, No. 1, 1945. 153 p.

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